CITY OF LONG BEACH

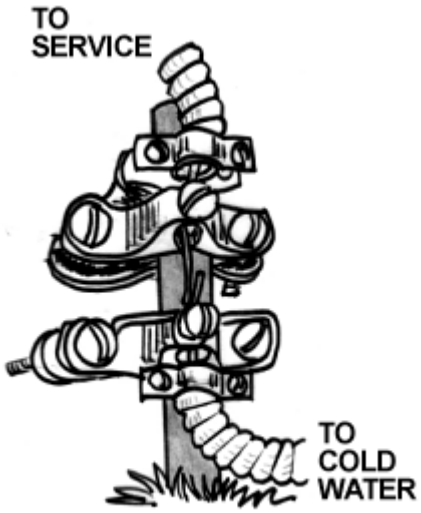
DEPARTMENT OF DEVELOPMENT SERVICES

333 West Ocean Blvd., 4th Floor Long Beach, CA 90802 (562) 570-6194 FAX (562) 570-6068

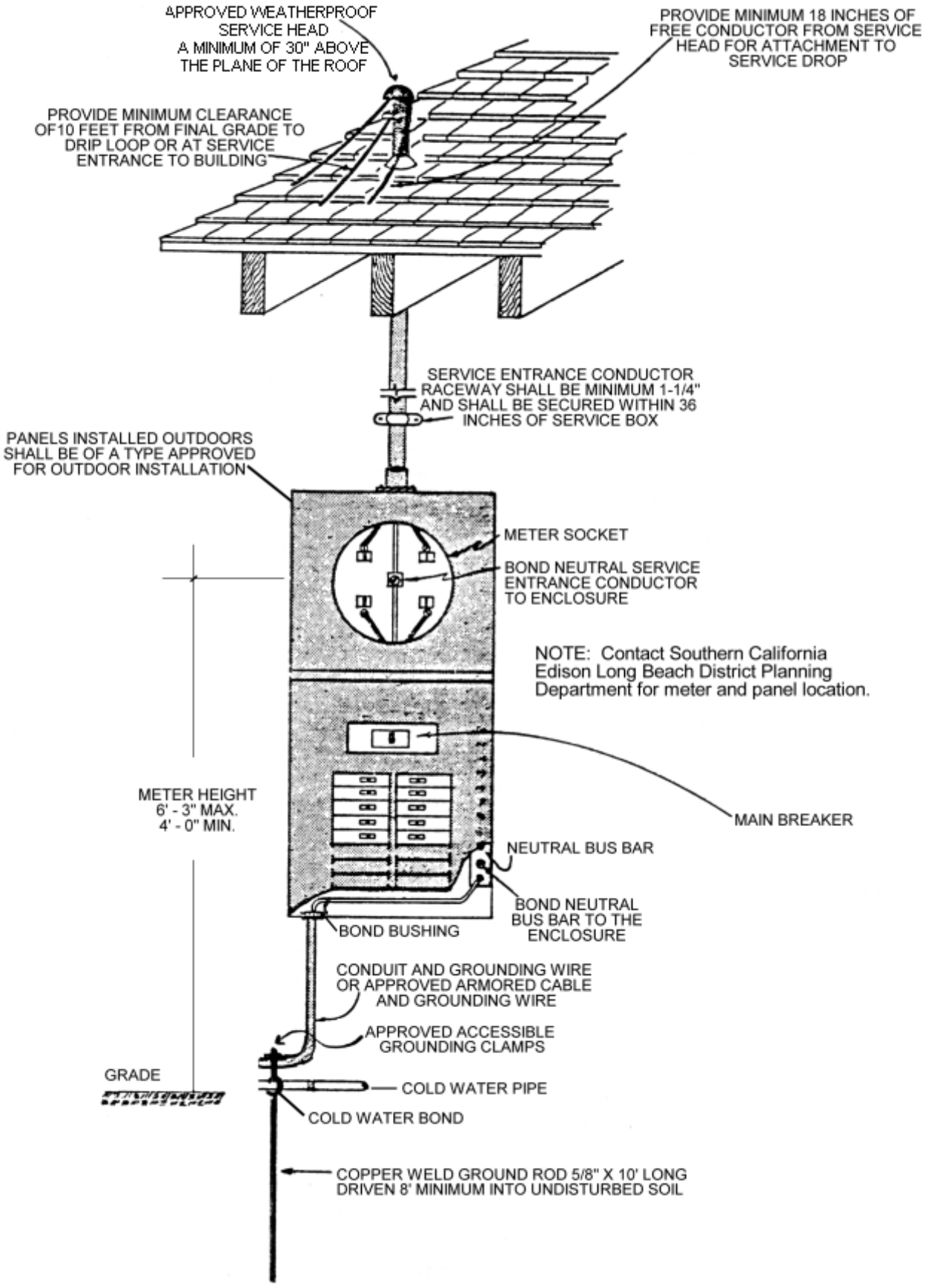
ELECTRICAL DETAILS, DIAGRAMS & TABLES

TYPICAL ELECTRICAL SERVICE DETAIL

SIZE OF GROUNDING AND BONDING WIRES		
SERVICE SIZE	**LARGEST SERVICE ENTRANCE CONDUCTOR**	**BONDING OR GROUNDING WIRE**
100 AMP	#4 or #3	#8 AWG
125 AMP	#2 or #1 or 1/0	#6 AWG
200 AMP	2/0	#4 AWG



Bonding and Grounding Clamp Detail


APPROVED WEATHERPROOF SERVICE HEAD A MINIMUM OF 30" ABOVE THE PLANE OF THE ROOF
PROVIDE MINIMUM 18 INCHES OF FREE CONDUCTOR FROM SERVICE HEAD FOR ATTACHMENT TO SERVICE DROP
PROVIDE MINIMUM CLEARANCE OF10 FEET FROM FINAL GRADE TO DRIP LOOP OR AT SERVICE ENTRANCE TO BUILDING
SERVICE ENTRANCE CONDUCTOR RACEWAY SHALL BE MINIMUM 1-1/4" AND SHALL BE SECURED WITHIN 36 INCHES OF SERVICE BOX
PANELS INSTALLED OUTDOORS SHALL BE OF A TYPE APPROVED FOR OUTDOOR INSTALLATION
METER SOCKET
BOND NEUTRAL SERVICE ENTRANCE CONDUCTOR TO ENCLOSURE
NOTE: Contact Southern California Edison Long Beach District Planning Department for meter and panel location.
METER HEIGHT 6' - 3" MAX. 4' - 0" MIN.
MAIN BREAKER
NEUTRAL BUS BAR
BOND NEUTRAL BUS BAR TO THE ENCLOSURE
BOND BUSHING
CONDUIT AND GROUNDING WIRE OR APPROVED ARMORED CABLE AND GROUNDING WIRE
APPROVED ACCESSIBLE GROUNDING CLAMPS
GRADE
COLD WATER PIPE
COLD WATER BOND
COPPER WELD GROUND ROD 5/8" X 10' LONG DRIVEN 8' MINIMUM INTO UNDISTURBED SOIL

CONDUCTOR SIZE AND CONDUIT REQUIREMENTS

MAXIMUM ALLOWABLE CURRENT CARRYING CAPACITY IN AMPERES OF INSULATED CONDUCTORS IN CONDUITS OR CABLES
(TW insulation and not more than three conductors in conduit or cables.)

Size AWG	Amperes (Copper)	Amperes (Aluminum)
No. 14	15	-
No. 12	20	15
No. 10	30	25
No. 8	40	30
No. 6	55	40
No. 4	70	55
No. 2	95	75
No. 1	110	85
No. 0	125	100

Note: When installing more than three conductors in conduit or cables, see Note 8, Table 310-16 for derating factors (National Electrical Code).

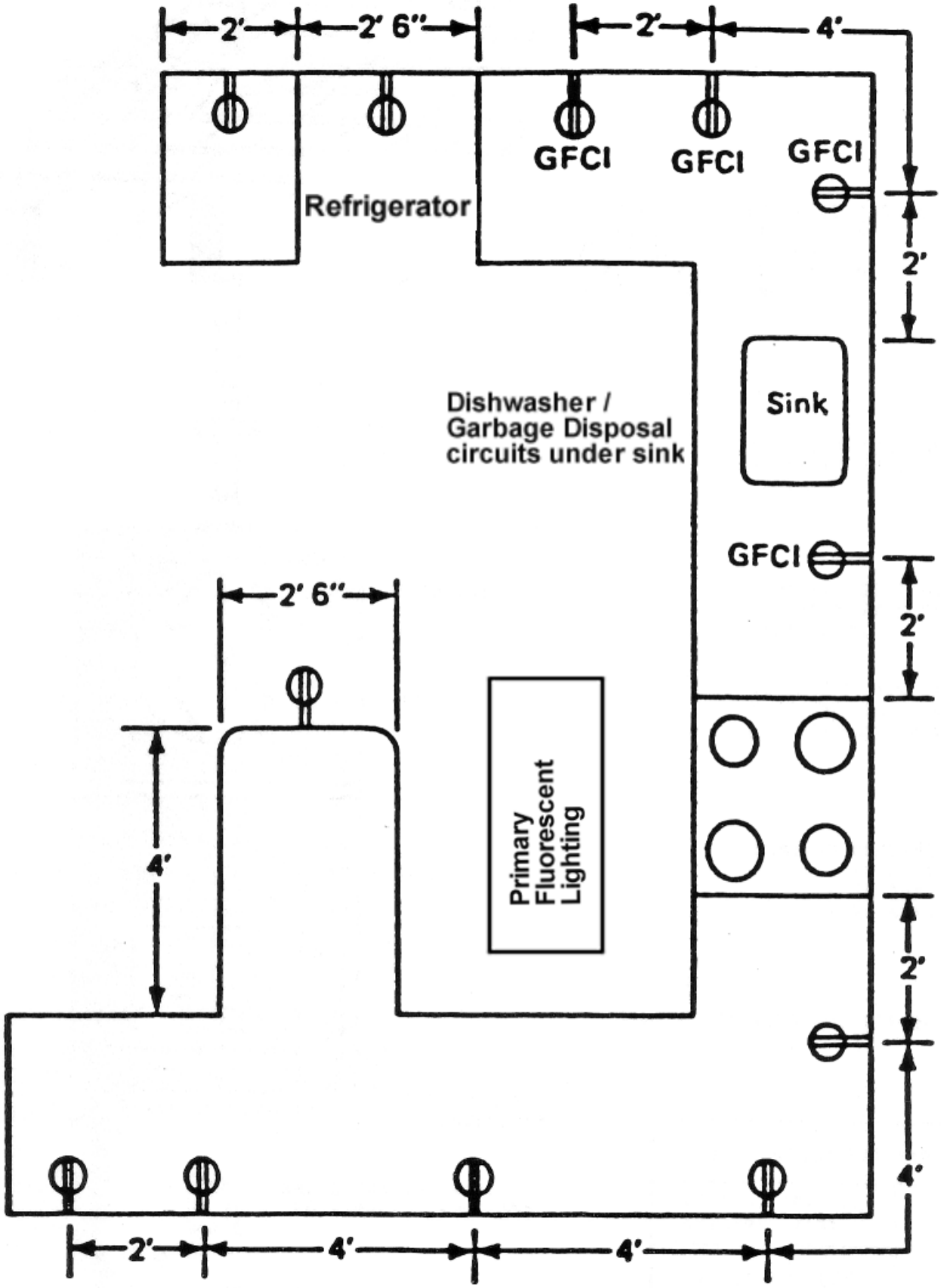
MAXIMUM NUMBER OF TW CONDUCTORS IN CONDUIT OR TUBING

Size AWG	Conduit or Tubing Size					
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
No. 14	9	15	25	44	60	99
No. 12	7	12	19	35	47	78
No. 10	5	9	15	26	36	60
No. 8	2	4	7	12	17	33
No. 6	1	2	4	7	10	16
No. 4	1	1	3	5	7	12
No. 2	1	1	2	4	5	9
No. 1	-	1	1	3	4	6
No. 0	-	1	1	2	3	5

TYPICAL KITCHEN APPLIANCE BRANCH CIRCUITS

- Receptacle outlets are required at each counter space wider than 12 in. spaced so that no point along the wall line is more than 24 in. from a receptacle. Island and peninsular type counter tops are required to have one receptacle for each 4 feet of counter-top. Counter-top outlets are required to be Ground Fault Circuit Interrupted (GFCI) protected. Outlets in the kitchen are required to be divided between two 20 amp. circuits.

- Primary task lighting in the kitchen must be fluorescent, however; secondary task lighting may be incandescent.


2'
2' 6"
2'
4'
GFCI
GFCI
GFCI
Refrigerator
2'
Dishwasher /
Garbage Disposal
circuits under sink
Sink
GFCI
2' 6"
2'
4'
Primary
Fluorescent
Lighting
2'
4'
2'
4'
4'

Type of Appliance	Branch Circuit Rating
Electrical range (240V)	50 amperes
Kitchen counter top small appliance branch circuit (120V)	20 amperes
Counter-mounted electric cooking unit (240V)	30 amperes
Dishwasher (120V)	15 - 20 amperes
Garbage Disposal (120V)	15 amperes
Wall-mounted electric oven (240V)	30 - 40 amperes
Microwave (120V)	20 amperes
Trash Compactor (120V)	15 amperes

Separate Circuit required for each of the above appliances

TYPICAL KITCHEN REMODEL

Your Kitchen Today

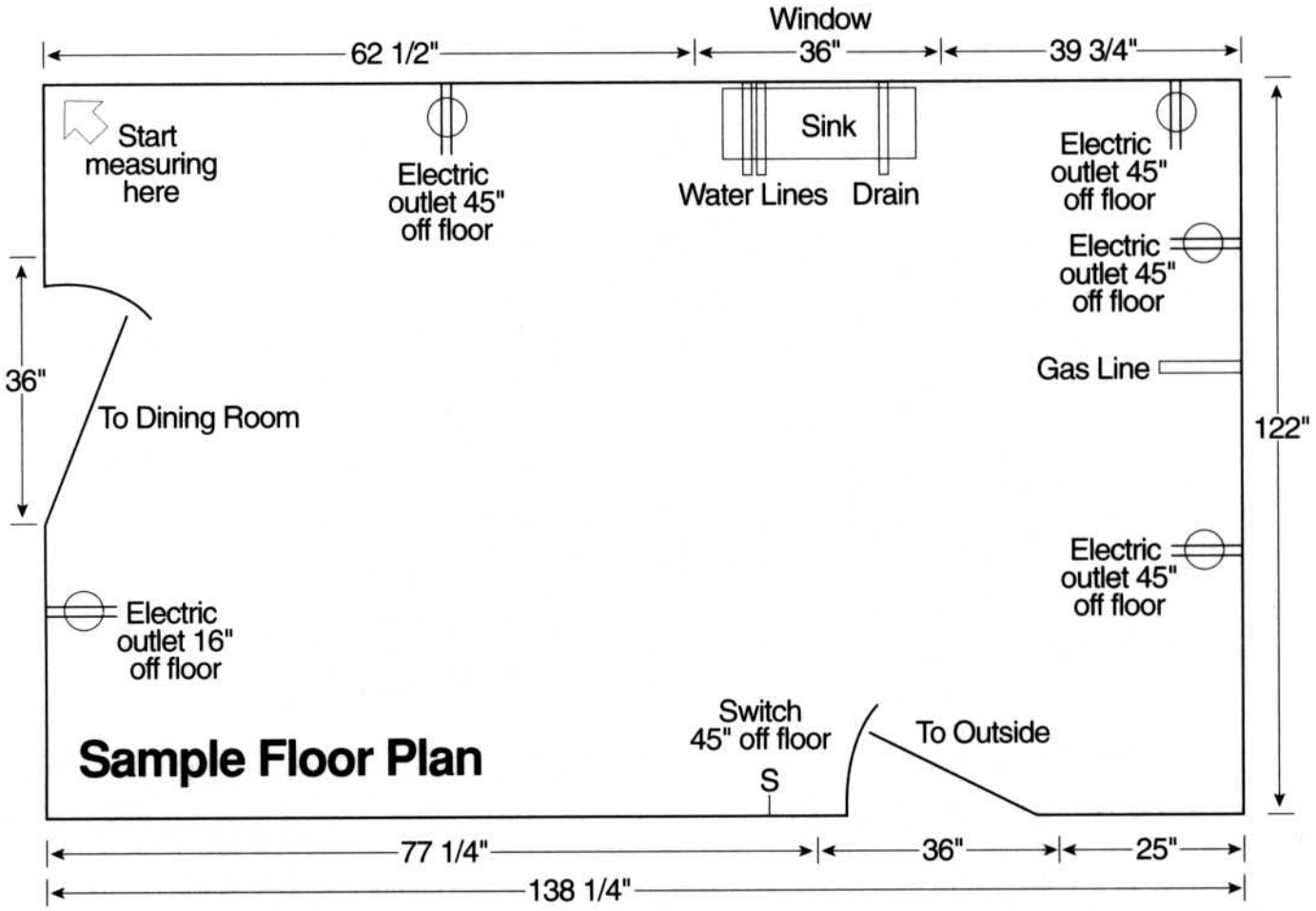
Sketch your kitchen as it looks today. Indicate doorways, windows, cabinets, major appliances, ventilation, electrical outlets, sinks, dishwasher, and other plumbing. It doesn't have to be exact, but draw it to scale as closely as possible. (1/2" equals one foot.) Use these tips to help design your new kitchen.

How To Measure Your Kitchen:

1. Draw a rough sketch of your kitchen.
2. Measure every wall, beginning at the left corner, to the far right corner.
3. Write the total measurements in inches.
4. Measure from left corner to edge of opening, window or door.
5. Measure across opening from trim edge to trim edge.
6. Measure from trim edge to far wall. Compare steps 3, 4, and 5 to step 2. Both totals should agree.
7. Mark exact location of sink, water drain, gas lines, electrical outlets and switches on the drawing. (Measure to the center of these, not the edge.)

Windows and Doors:

1. Measure from floor to windowsill.
2. Measure from windowsill to top of window.
3. Measure from top of window to ceiling.
4. Measure from floor to ceiling. Total of steps 7, 8, and 9 should equal this measurement.
5. Measure width of door from trim edge. Indicate position of door swing.
6. Measure remaining three walls; follow steps 2 through 11.
7. Measure stove, refrigerator, microwave, dishwasher, and sink, and list on drawing.
8. Double-check all your measurements.



TYPICAL INDOOR INSTALLATION OF SPA, HOT TUB OR HYDROMASSAGE

- All light fixtures or light outlets located directly over the spa or hot tub, shall have a minimum clearance of seven feet and six inches (7' 6") and shall be protected by a Ground-Fault Circuit-Interrupter (GFCI), OR, shall have a minimum clearance of twelve feet (12') above the spa or hot tub.
  Switches shall be located at least five feet (5'), measured horizontally, from the inside walls of the spa or hot tub.

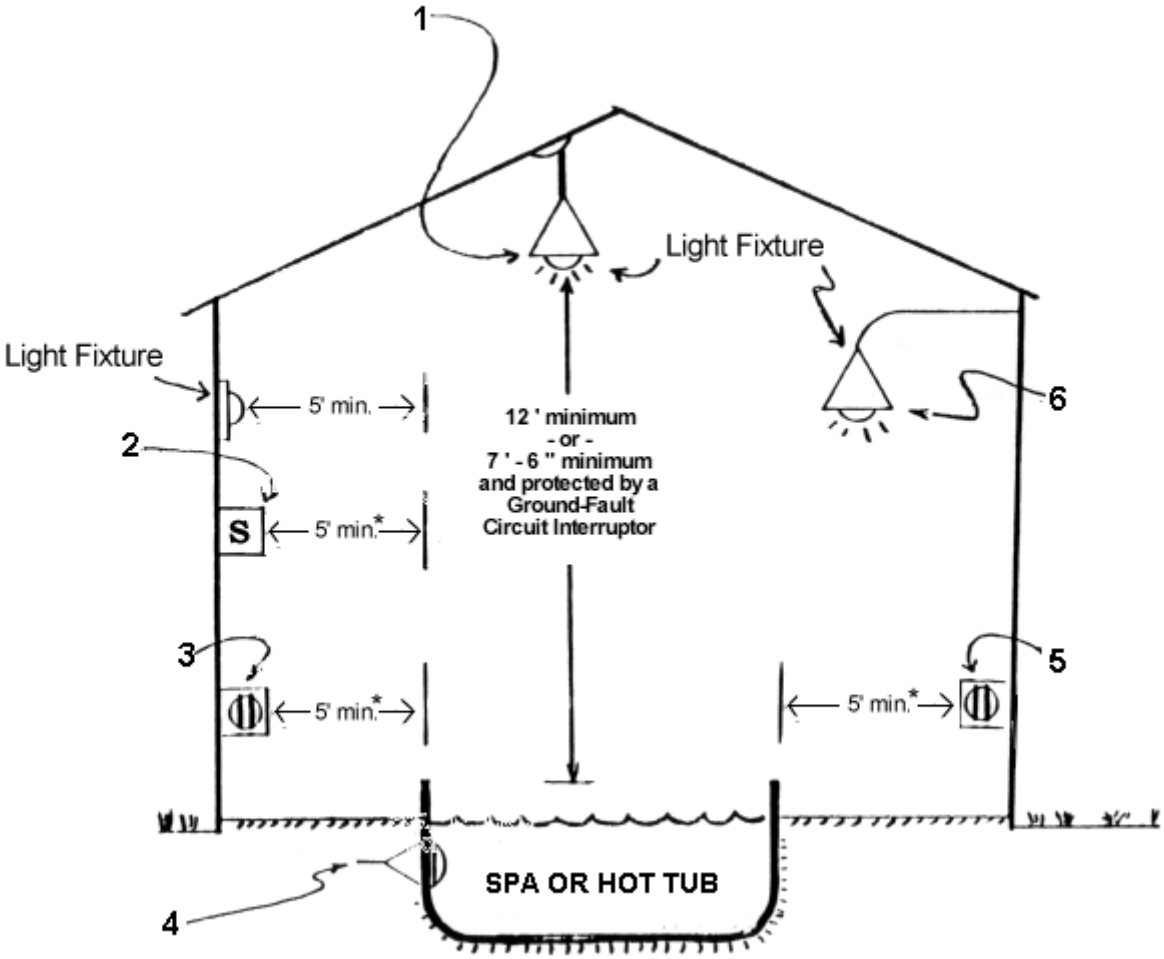
- A Ground-Fault Circuit-Interrupter shall protect receptacles that provide power for a spa or hot tub. Receptacles on the property shall be located at least five feet (5') from the inside walls of the spa or hot tub.

- Underwater light fixtures shall comply with Part B, Article 680 of the National Electrical Code.
  125-volt receptacles located within ten feet (10') of the inside walls of a spa or hot tub shall be protected by a Ground-Fault Circuit-Interrupter.

- All light fixtures or light outlets located within five feet (5') from the inside wall of the spa or hot tub shall have a minimum clearance of seven feet and six inches (7' 6") above the spa or hot tub and shall be protected by a Ground-Fault Circuit-Interrupter, OR, shall have a minimum clearance of twelve feet (12') above the spa or hot tub.

HYDROMASSAGE BATHTUB

Hydromassage bathtubs and their associated electrical equipment are required to be G.F.C.I. protected. All receptacles in the bathroom must be G.F.C.I. protected. All receptacles within 5 feet of hydromassage bathtub must be G.F.C.I. protected. In an existing bathroom where a hydromassage bathtub is installed, an existing wall switch and/or receptacle shall be permitted when protected by a Ground-Fault Circuit-Interrupter. No part of cord-connected fixtures, hanging fixtures, or pendants shall be located within a zone measured 3 feet horizontally and 8 feet vertically from the top of the bathtub rim. This zone is all encompassing and includes the zone directly over the tub.



TYPICAL OUTDOOR INSTALLATION OF POOL, SPA OR HOT TUB

- For permanent installations at dwelling units, it is mandatory to install a 125-volt receptacle a distance of ten to twenty feet from the inside wall of the pool, spa, or hot tub. The receptacles shall be protected with a Ground-Fault Circuit-Interrupter.

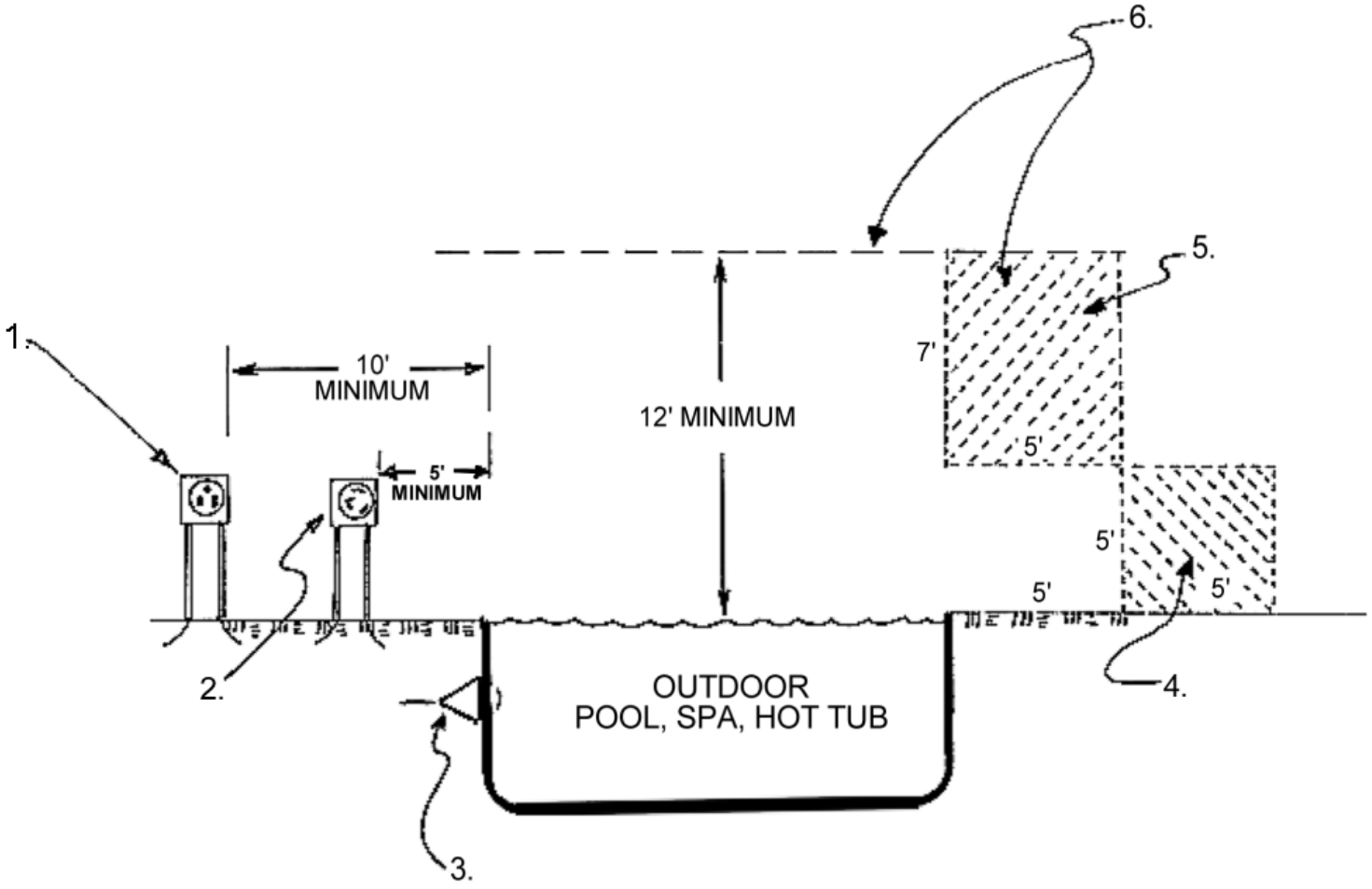
- Locking and grounding type receptacle for power to recirculating pump motor shall be protected with a Ground-Fault Circuit-Interrupter.

- The following pool, spa, or hot tub parts shall be bonded: All metallic parts of the structure, all forming shells, metal fittings within or attached, metal parts of electrical equipment of the water system. Metal conduit, metal pipe, metal surfaces, electrical devices, controls, all of which are within five feet (5') of the inside wall of the pool, spa or hot tub.

- Light fixtures and light outlets in the area extending between five feet and ten feet horizontally from the inside wall and less than five feet above the maximum water level, shall be protected by a Ground-Fault Circuit-Interrupter. Switching devices on the property shall be located at least five feet from the inside walls of the pool spa or hot tub, unless separated from the pool, spa or hot tub, by a solid fence, wall, or other permanent barrier.

- Existing light fixtures and light outlets are only permitted within five feet horizontal distance of the inside walls of the pool, spa, or hot tub. Also fixtures shall be rigidly attached to the existing structure and located at least five feet above the pool, spa or hot tub.

- Light fixtures and light outlets shall not be installed over the pool, spa, or hot tub, or over the area extending five feet horizontally from the inside walls of the pool, spa or hot tub, unless located at least twelve feet above the maximum water level.


6.
5.
1.
10'
MINIMUM
12' MINIMUM
7'
5'
5'
MINIMUM
5'
5'
5'
2.
OUTDOOR
POOL, SPA, HOT TUB
4.
3.